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STATEMENT OF
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BEFORE THE
SEAPOW, STRATEGIC, AND CRITICAL MATERIALS SUBCOMMITTEE
OF THE
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ON
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ENCLOSURE(1)

INTRODUCTION

The past year has been marked by an apparent end of the Cold War as we knew it over the past 45 years and by rising turmoil and instability inside the Soviet Union. Both these developments will make our world considerably less predictable, and both will affect the character of the challenge that the Navy must be prepared to meet.

In the past, the United States focused almost exclusively on the Soviet threat. Now, while the character of the Soviet threat has moderated, we face a rapidly changing world in which other nations or political movements find themselves less constrained by superpower influence and more inclined to take advantage of world events to further their own ends. Iraq is already a paradigm in this regard. One wonders if, as a client of a strong USSR still engaged in a superpower competition with the U.S., Saddam would have been permitted to invade Kuwait.

In terms of the threat to the U.S. Navy and to our ability to carry out our mission, Soviet naval capabilities have not declined all that much. Further, the proliferation of sophisticated weapons and technology has underlined the fact that the Third World powers are no longer necessarily "third rate" threats. These changes have caused us to reassess the character of the threat confronting the U.S. Navy and to recognize that we

must be prepared to respond to four distinct levels of threat.

The threat posed by:

- 1 - A global power;
- 2 - A regional power;
- 3 - Contingency And Limited Objective (CALO) operations; and
- 4 - Nonconventional-level activities.

At the global level, a potential adversary would be characterized by:

- The ability to use nuclear weapons worldwide;
- A large and capable standing army and air force;
- A blue-water navy with a powerful submarine fleet, a robust surface force, and at least a limited power projection capability;
- A weapons/sensor technology and warfare capability on, or nearly on, a par with the United States;
- Worldwide C3I;

- The ability to conduct space warfare and/or to disrupt U.S. access to space; and
- The ability to conduct a sustained defense of territory and contiguous waters.

A regional power may possess similar capabilities, but at a reduced geographic scope. Typically, it would possess:

- A blue-water navy with technologically sophisticated AAW, ASW, and ASUW capability;
- Capable air and air defense forces and a large standing army;
- Regional C3I; and
- The ability to defend its territory and contiguous waters against at least a short-term threat.

A regional power may also be expected to attempt to exert its power outside its immediate area and to insist on its prerogatives for controlling regional politics.

A local power has more limited capabilities to threaten our CALO operations but has the capacity to foster regional

instability and to interfere with U.S. interests in the immediate area. Such a local power would be:

- Capable of creating a local crisis - even if not capable of sustaining one; and
- Capable of a credible defense of its own territory over the short-term.

Finally, the non-conventional threat is posed by political, ethnic, criminal, or religious groups opposed to U.S. interests. They would pose a limited conventional threat but would typically be capable of isolated hostile acts involving loss of life, hostages, damage to facilities, and political embarrassment.

GLOBAL POWER

The Soviets certainly still meet the criteria for being a global power. Although the Soviet Union is experiencing fundamental changes, it still:

- Retains the world's largest military establishment;
- Retains a massive nuclear strike capability;

effectively. These are not just weapons of mass destruction but are also medium- and high-technology systems, usually of Western manufacture, that are becoming more "user friendly" and are being sold as "turn key" operations along with their means of support and, increasingly, even the means of production. The mix of Soviet, Western, and indigenously-produced and modified systems complicates the threat environment and increases risks and battle management problems for U.S. forces and allies.

Arms proliferation is spurred by several factors that have contributed to a burgeoning "buyers market" for weapons, hardware, and the means of production. The arms trade is highly profitable and is growing. Increased competition for hard currency has fueled a relative decline in concern over compromising technologies developed during the Cold War. Surplus weapons systems left over from the Cold War are up for sale, and there has been a marked lack of success in controlling certain technologies with either direct military or dual-use applications. Last year saw the elimination of export controls over a wide range of COCOM-proscribed technologies. The former Warsaw Pact nations are now also able to export relatively sophisticated Soviet-designed weapons.

Soviet Exports

In the last five years, the years of perestroika, we have noted that new Soviet systems are being exported sooner after their introduction into Soviet service, partly due, we believe, to Soviet attempts to acquire vital hard currency. Exports have included Tu-142/BEAR F, Su-24/FENCER, MiG-29/FULCRUM, and Su-25/FROGFOOT aircraft, advanced radar systems such as TIN SHIELD, and a variety of missiles, including the SA-5 and SA-10 -- the latter to former Warsaw Pact members only. The Soviets have also been trying to sell the SA-10 outside the Warsaw Pact and have also just offered the recently-introduced SA-15. The artificially low prices of Soviet equipment (and of the accompanying maintenance agreements) of the 1980s, however, are not likely to continue beyond the next several years.

SOVIET AIRCRAFT EXPORTED IN 1990

<u>Type</u>	<u>Countries</u>	<u>Unrefueled Combat Radius(nm)</u>	<u>Max Speed(kts)</u>	<u>Max Altitude(ft)</u>
Su-7/17/FITTER	Burma/Syria	380	1200	59,000
Su-24/FENCER D	Iraq	740	1450	57,000
MiG-21/FISHBED	Iraq	410	1150	59,000
MiG-23/FLOGGER	Syria	580	1320	59,000
MiG-29/FULCRUM	India/Iran/Iraq	550	1320	56,000
Mi-17/HIP H	Libya/Syria	110	150	18,700
Mi-24/HIND	India/Libya	120	175	15,500
Ka-28/HELIX	Syria	185	175	19,400

CHARACTERISTICS OF SOVIET SAM EXPORTS

<u>Type</u>	<u>Range (nm)</u>	<u>Altitude (kft)</u>	<u>Speed(mach)</u>	<u>Warhd Weight (lbs)</u>
SA-2	22.0	59.0	3.5	420.0
SA-3	13.5	42.0+	2.0+	150.0
SA-5	160.0	95.0	4.0	660.0
SA-6	16.0	59.0	2.8	110.0
SA-7	2.7	14.8	1.7	2.6
SA-8	6.0	39.0	2.0	35.0
SA-9	4.3	20.0	1.5	5.7
SA-13	5.4	16.0	1.5	8.8
SA-14	2.7	14.8	1.7	2.6

THIRD WORLD COUNTRIES WITH SOVIET SAMS THROUGH 1990

SA-2:	Afghanistan/Algeria/Angola/Cuba/Egypt/Ethiopia/India/Iran/Iraq/Libya/Mozambique/N.Korea/Somalia/Sudan/Syria/Vietnam/Yemen/Yugoslavia
SA-3:	Afghanistan/Algeria/Angola/Cuba/Egypt/Ethiopia/Finland/Iraq/Libya/Mozambique/N.Korea/Peru/Somalia/Syria/Tanzania/Vietnam/Yemen/Zambia
SA-5:	Iran/Libya/N.Korea/Syria
SA-6:	Algeria/Angola/Cuba/Egypt/India/Iran/Iraq/Kuwait/Libya/Syria/Tanzania/Vietnam/Yemen/Yugoslavia
SA-7:	Algeria/Angola/Argentina/Botswana/Cuba/Egypt/Ethiopia/Ghana/Guinea/Guinea-Bissau/Guyana/India/Iran/Iraq/Jordan/Kampuchea/Laos/Lebanon/Libya/Mauritania/Mongolia/Mozambique/Morocco/Nicaragua/N.Korea/Oman/Peru/Seychelles/Somalia/Sudan/Syria/Tanzania/Uganda/Yemen/Zambia/Zimbabwe
SA-8:	Algeria/Angola/India/Iraq/Jordan/Libya/Syria
SA-9:	Algeria/Angola/Cuba/Egypt/India/Iraq/Jordan/Libya/Syria/Vietnam/Yemen/Yugoslavia
SA-13:	Angola/Cuba/Iran/Iraq/Jordan/Libya/Syria
SA-14:	Angola/Cuba/Iran/Iraq/Jordan/Nicaragua

Deliveries of Soviet military hardware in 1990 continued to decline in overall terms, partly because of a reordering of foreign policy priorities but also as a result of severe Soviet economic problems. The number of Soviet seaborne arms deliveries in 1990 was significantly lower than the 1989 figure. Soviet military cargo tonnage was also much reduced from that of 1989, further highlighting the trend. All of the fourteen top Soviet client states registered significant decreases in deliveries except for Yemen and Iran, the latter having begun to rearm its military partially with Soviet equipment. Highlights of Soviet deliveries to major clients include:

- Iraq received two BOGOMOL patrol boats, Mi-17/HIP H helicopters, Su-24/FENCER D fighter-bombers, "up-armored" tanks, a variety of armored personnel carriers, and SS-N-2 STYX missiles, in addition to refurbished FITTER aircraft. Baghdad, whose ground forces are largely built around Soviet-Eastern Bloc equipment, undoubtedly would have taken delivery of more were it not for the imposition of UN sanctions following the invasion of Kuwait.

- Iran has begun the long and expensive process of rebuilding its military following the eight-year war with Iraq. With U.S. equipment unavailable (and likely to remain so), Tehran has turned to the Soviet Union, North Korea, and China. The

most significant Soviet deliveries to date have been SA-5 and SA-6 missiles and as many as 20 MiG-29/FULCRUM fighters.

-- During 1990, Moscow generally adhered to the provisions of the current (1986-1990) five-year plan for military aid to Cuba, delivering about the same dollars worth of equipment as in 1989, although the tonnage was down. Notable deliveries included MiG-29/FULCRUM fighters, a modified PAUK class patrol combatant, T-62 tanks, and transport aircraft. In addition, Cuba continues to repatriate Soviet-supplied equipment from Angola. The Soviets clearly intend, however, to reduce military and economic assistance to Cuba substantially over the next two years.

-- Soviet hardware deliveries to India were down in 1990 when compared with previous years, mostly due to Indian budgetary constraints, stiffer Soviet pricing policies, and contract completions. India also is striving to meet more of its arms requirements from domestic production, importing only the largest and the most sophisticated items. In 1990, India took delivery of its seventh KILO class submarine from the Soviet Union. The eighth is expected to arrive in Bombay in February or March. Additionally, TARANTUL PGGs (two); MODIFIED PAUK patrol combatants; T-72 tanks; Mi-24 HIND helicopters; MiG-29 FULCRUM aircraft; SA-3, SA-8, and

SA-13 surface-to-air missiles; SS-N-2 STYX anti-ship missiles; and a variety of armored vehicles were delivered.

-- Vietnam received a dozen Su-7/17 FITTER aircraft, five patrol boats, and SS-N-2 STYX missiles, generally continuing the decrease in deliveries noted in recent years.

-- One of Libya's most significant acquisitions was an Il-78 tanker and associated equipment, which will allow in-flight refueling of Libyan fighter/attack aircraft. Additional equipment delivered last year includes SA-9 mobile SAM launching vehicles, Mi-24/HIND helicopters, and SA-3 launchers, while some Mi-17/HIP H helicopters were returned to Libya after overhaul. Libya was also among the recipients of windfall profits caused by rising oil prices after Iraq's invasion of Kuwait, so that its financial position as an arms importer (which had declined due to falling oil prices during the 1980s) was temporarily reinvigorated.

-- A number of impoverished Soviet weapons clients continued to take Soviet deliveries: Ethiopia received two ZHUK patrol boats; Syria received Mi-17 HIP H helicopters, Ka-28 HELIX helicopters, and several MiG-23 FLOGGERS and Su-17 FITTERS returned after refurbishment in the Soviet Union; Yemen received Mi-17 H helicopters, STYX missiles, T-55 tanks,

- North Korea can meet many of its military needs but must seek outside assistance for more advanced systems such as high performance aircraft and components. Pyongyang has also sought to increase its arms exports, but continues to suffer from a reputation for poor quality. Nonetheless, it may have transferred short-range ballistic missile (SRBM) components, as well as multiple rocket launchers (MRLs) and artillery. North Korea "exports" military advisory teams and special forces personnel.

- Prior to DESERT STORM, Iraq had developed a sizeable capability to manufacture munitions of all kinds, ballistic missiles, chemical weapons, and such naval systems as mines and small patrol boats. Iraq also exported arms to Djibouti, Sudan, Mauritania, and Lebanon, although much of the equipment sold had been captured from or abandoned by Iran in the last phase of the war.

- In the 1970s, Argentina undertook a major effort to expand its arms production capability for domestic use. It designs and produces relatively unsophisticated weapons such as trainer/light attack aircraft and light armored vehicles, relying on foreign licensing agreements for more advanced weapons production, such as MEKO 140 frigates and TR-1700 submarines, both of which were designed in Germany. Argentina sells relatively little of its arms output, and

what it does sell goes mainly to neighboring Latin American countries, such as Bolivia, Paraguay, Peru, and Uruguay.

- Brazil's arms industry has supplied numerous weapons such as armored cars, aircraft, and tactical missiles to a variety of countries worldwide, including Libya and Iraq. For a variety of reasons, however, the industry is in dire economic straits, and the sudden cutoff of lucrative Iraqi contracts because of UN sanctions has been an additional blow. Faced with the prospect of spending billions to bail out the bankrupt arms producers, the government has eagerly sought customers elsewhere.
- Chile's private arms producers have sold cluster bombs and other munitions to Iraq since the early 1980s and stand to lose millions as a result of sanctions imposed following Iraq's invasion of Kuwait. Producer Carlos Cardoen also admits experimenting with fuel-air explosive (FAE) technology, which could touch off a regional arms race, and during 1990 he gained control of an Italian firm that builds mini-submersibles for export.
- India, which meets a large percentage of its own arms requirements from domestic production, imports only more sophisticated weapons systems or components. India has a large aerospace and arms production base consisting of 34

development and production of an indigenous fighter and U.S.-designed guided missile frigates. Taiwan is not a major arms exporter. Its shipbuilding industry is capable of producing state-of-the-art naval ships up to frigate size and complexity, and related industries are also developing complex radar and weapons direction systems, naval mines, missiles, and ASW equipment. Taiwan is currently building eight modified versions of the U.S. OLIVER HAZARD PERRY class frigate in its largest-ever arms acquisition program. So far, fear of PRC reaction has prevented most major sales to or from Taiwan.

TECHNICAL AND WEAPONS-RELATED TRENDS

There is a growing array of user friendly, moderately high-tech, "turn-key" weapons systems available to the Third World. Modular designs aid in tailoring to specific national requirements and pocketbooks, as well as simplifying maintenance and upgrades. Individual weapons and electronic suites are modularized for easy replacement. The trend in aircraft, for example, is toward a multi-role approach. Aircraft with relatively high capabilities combined with low maintenance requirements are increasingly available. Two good examples are the British HAWK series and the Franco-German ALPHA-JET. Relatively simple to operate, both are used by many nations either as trainers or light bombers. The HAWK 200 derivative is

advertised as having an all-weather capability and can deliver a variety of munitions including anti-air and anti-ship missiles. An expanded service package offering a wide range of assistance is also a proven sales technique, as illustrated by an Italian mini-sub sales brochure which offers, " . . . assistance in the field of underwater warfare as well as in designing and providing submarine bases with all kinds of facilities for berthing, supply, workshops, and . . . full assistance for crew training." Indeed, the builder, as mentioned before, is now owned by Chilean arms merchant Carlos Cardoen, has sold mini-sub to Taiwan, Pakistan, Colombia, South Korea, and elsewhere.

In addition to importing weapons, many countries, including India, Iraq, Iran, Pakistan, Syria, and Libya, are developing or producing at least some of their own munitions, sub-systems, and capabilities. This not only saves money in the long run, but also develops a production capacity which insulates them from embargoes, provides another source of exports, and enhances national prestige and power. There continues to be an ongoing technology transfer effort to such countries from North Korea and China, and from a host of free-lance European and South American technicians, particularly by experts in surface-to-surface and surface-to-air systems. With this foreign input come enhancements in weapon ranges, accuracy, and lethality.

Arms exporting countries have previously transferred finished products, particularly armor, missiles and aircraft, to client states. Current trends toward shipping equipment components in crates and containers makes verification difficult. Further, transferring production technology, with assembly in the client country, affords greater security, decreased delivery time, and lower ultimate cost to recipients. Another noted trend is the use of brokerage firms in one or more third countries, a commercial device that obscures the trail of the equipment, making it more difficult to determine the end user and facilitates the acquisition of prohibited materials. Existing control regimes focus on individual components in the manufacturing process, while the export of turn-key factories which can later be modified or diverted to military usage is not prohibited.

Reverse engineering and re-engineering of various weapons by such countries as the USSR, China, North Korea, and Iraq, has long been taking place, and, as the Third World technological base becomes more sophisticated, the practice is likely to become increasingly widespread. Anti-ship missiles (such as the Taiwanese and South African copies of the Israeli Gabriel), anti-tank missiles, and man-portable surface-to-air missiles have appeared on the export market and have been operationally deployed.

System Integration

The United States and its allies are no longer facing a relatively "standard" set of mainly Soviet hardware. Mixed East-West systems have complicated both the threat environment and the intelligence collection problem. For example, an integrated air defense system (IADS) approach in Iraq, using spliced Free World, Soviet, and indigenously-modified arms and sensors results in a unique system, making it more difficult for us to understand and counter its parameters.

We believe the trend towards longer-lived, more maintainable systems, especially those with cheap, interchangeable sub-components, will help Third World forces redress significant current weaknesses (notably, their general lack of qualified technical maintenance personnel), reducing system down-time and allowing increased operational training time.

Nuclear, Biological, and Chemical Warfare (NBC) Capabilities

Last year may serve as the year when the brandishing of nuclear, biological and chemical (NBC) weapons in regional or international disputes became almost a norm. Having used chemical weapons (CW) against its own population in 1988, Iraq threatened CW use against Israel and the UN coalition during operation DESERT SHIELD/DESERT STORM. It developed its own

biological weapons (BW) agents and has been devoting vast resources to the development of nuclear weapons. Iraqi and Libyan state-sponsorship of terrorists raises the specter of these groups getting possession of chemical and biological agents. Stresses between India and Pakistan led both countries to posture use of chemical and nuclear weapons. We believe that, despite the best efforts of non-proliferation regimes over the last two decades, many, if not most, of the regional crises we see developing today bear the risk of involving such weapons.

Nuclear Weapons

The events of 1990 heightened world-wide concern over nuclear proliferation. Early in 1990, tensions once again began to rise between India and Pakistan over the perennially unsolved issue of Kashmir. A war between these antagonists --both more heavily armed and equipped than ever before -- could possibly include the nightmare scenario of a nuclear exchange.

The Nuclear Non-Proliferation Treaty (NPT), with over 140 signatories, and its regulatory arm, the International Atomic Energy Agency (IAEA), may have inhibited some countries in their plans to develop nuclear weapons. The NPT and IAEA, however, are also charged with promoting the "peaceful uses of atomic energy," often with what some critics regard as the disastrous result of training the physicists of countries with nuclear-weapons

ambitions. Be that as it may, many states have not allowed the activities of the IAEA or other international community efforts to interfere with their pursuit of nuclear weapons.

In the Middle East, Iraq's aggressive program to acquire nuclear weapons takes on heightened significance given the current state of affairs in the Middle East. Even before the current crisis erupted, concern was mounting about Saddam's acquisition of a nuclear weapons capability, and customs officials in both the United States and Western Europe had intercepted illegal shipments of Western-produced items critical to Iraq's nuclear program.

China is not an NPT signatory and has provided nuclear related technology assistance to Pakistan. There are fears that Beijing's desire for foreign exchange could lead it to provide technology and assistance to states (such as Libya and Iran) that have the intention of acquiring nuclear weapons and the financial resources to pay for them.

Chemical Weapons

An increasing number of Third World countries are evincing interest in developing chemical weapons for offensive or retaliatory purposes. The technology to produce such weapons is relatively inexpensive and is commercially available. The types

of equipment used in producing legitimate pesticides or pharmaceuticals can also be used to produce chemical or biological agents. Biotechnology and chemical engineering advances have made agent production more efficient and the production of additional types of agents feasible.

At least fourteen countries outside of NATO and the Warsaw Pact currently have an offensive chemical warfare (CW) capability. Many of these nations are likely to assist other countries in developing offensive capabilities as well. Ten more nations are believed to be either developing (or are suspected of seeking) an offensive CW capability.

The spread of chemical weapons continues with little or no sign of abating, despite abortive international attempts to standardize export controls on the necessary chemicals and equipment. Again, the threat of major wars in several regions of the globe has raised the possibility of chemical warfare on a grand scale. Prior to DESERT STORM, Iraq had the largest chemical warfare program in the Third World, and it is the only country with extensive experience in the use of chemical weapons. Chemicals can be delivered by a wide variety of Iraqi munitions.

Fears over a war between India and Pakistan have also raised the question of possible chemical weapon use. India, especially, has a large industrial infrastructure, including fertilizer

manufacturing plants, that could be redirected toward the production of chemical agents. Pakistan has sought aid in obtaining technology and precursor chemicals to counter the perceived Indian threat.

NON-NATO/WARSAW PACT COUNTRIES WITH OFFENSIVE CW CAPABILITY

PROBABLY POSSESS

BURMA	LIBYA
CHINA	NORTH KOREA
EGYPT	PAKISTAN
INDIA	SOUTH KOREA
IRAN	SYRIA
IRAQ	TAIWAN
ISRAEL	VIETNAM

MAY POSSESS

INDONESIA
SAUDI ARABIA
SOUTH AFRICA
THAILAND

There is convincing evidence that Libya is continuing its chemical weapon program and may have begun construction of a second chemical warfare agent production plant in addition to the one operating at Rabta.

Biological Weapons

Initiation of a biological warfare (BW) program often follows the development of a CW program. Iraq and Syria currently have developed an offensive BW capability. At least five other countries have offensive biological warfare (BW) programs in varying stages of development. Some of these nations may have a current offensive capability.

The growing availability of biotechnology, equipment, and needed materials make biological warfare (BW) agents an increasingly attractive weapon to Third World nations. As with chemical weapons, the vast expense and industrial infrastructure necessary to produce nuclear weapons are avoided, and much of the technology and hardware is commercially available. Iraq's possession of BW agents has served to heighten awareness concerning the proliferation of this capability. Iraq has "weaponized" the BW agents anthrax and botulinum toxin, although little is known of Iraqi doctrine regarding their use or of Saddam's intentions. These agents create nightmares for planners and would vastly complicate the battlefield situation. Quite apart from immediate casualties, entire regions could be rendered uninhabitable for years if contaminated by anthrax spores.

Submarines

The worldwide submarine population is down from last year, primarily because of Soviet, British and U.S. Navy reductions. Nevertheless, other than the U.S. and USSR, some 41 countries collectively possess 393 subs, down from about 408 last year. Nineteen countries are either currently building submarines or have recently done so, and three or four others are preparing to build submarines in the near future (Taiwan and South Korea, and possibly Chile and Canada).

Although the absolute numbers of Third World submarines are not expected to grow, the sophisticated submarine technology that is becoming available will increase the threat posed by undersea craft in unfriendly hands. Potent weapons systems are available in the form of submerged-launch anti-ship missiles (U.S. HARPOON and French SM-39 EXOCET), heavyweight wire-guided torpedoes, and sonar systems with improved signal processing and towed and flank arrays, and are also being developed for export. Submerged endurance can be boosted by air independent propulsion (AIP) systems and better batteries. Stealthiness is enhanced by improved sound-mounting and equipment isolation.

Seven nations have exported most of the new construction submarines ordered over the last two decades: Sweden, Great Britain, Germany, the Netherlands, France, the USSR, and China.

-- The most successful submarine exporter is Germany, which has sold over 50 submarines worldwide and which offers co-production as an inducement to buy. Germany has demonstrated an air independent propulsion (AIP) system based on fuel cell technology and offers it as a retrofit "plug-in" for existing submarines.

-- Sweden's first foreign submarine contracts are for its TYPE 471 design, which is being built as the COLLINS class in Australia. Swedish engineers have also conducted successful

- Brazil received its first TYPE 209 from West Germany in 1988, and is building three more indigenously, although progress has been extremely slow and the first will now not be completed until at least 1995. Design/construction of a prototype submarine nuclear reactor will reportedly be completed by the end of 1995, and Brazil plans to build its first nuclear submarine after 2005.
- Argentina is also attempting to produce German-designed submarines (TR-1700) under license, but the program has been beset with financial and technical difficulties, and no indigenously-built unit has been launched to date.
- South Korea is also building a submarine force. The first of a planned dozen TYPE 209 diesel attack submarines is under construction in Kiel, Germany, with subsequent units to be indigenously produced in South Korea. It already has some experience in building mini-sub.
- Australia is building six Swedish-designed Kockums TYPE 471 submarines at a new facility at Port Adelaide.

Despite expected technology improvements, there are a number of factors that currently limit diesel submarine force effectiveness, particularly in the Third World. These include modest sonar and processing capabilities, low endurance at higher

submerged operating speeds, a limited long-range targeting capability, and the inability to maintain (or even achieve) adequate material readiness and crew proficiency. Many, if not most, Third World navies simply cannot operate modern submarines at or near their operational potential.

While technology limitations tend to have the same effect on all Third World submarine forces, actual operational capabilities vary widely. Libya is perhaps the worst example of submarine operability and crew proficiency: of their six FOXTROT submarines, only one or two are potentially operational, and no routine at-sea operations have been noted over the last seven years. China has produced and India has acquired large submarine forces which are relatively well-maintained and which routinely operate at sea.

Tactical Ballistic Missiles (TBM)

Proliferation of tactical ballistic missiles (TBMs) and Western technological assistance will give many Third World countries offensive capabilities they could not have developed on their own by the end of this decade. As long-range delivery vehicles for weapons of mass destruction, they portend a new and ominous dimension to regional warfare. Vintage technology Chinese and Soviet TBMs, such as SCUD, comprise the bulk of the Third World inventory, but modern missiles from these traditional

suppliers, as well as Indian and Pakistani missile development programs, are competing in a lucrative and demanding market. Modern programs are stressing improvements in range, speed, payload, and accuracy, and it is expected that developers will simplify operation and maintenance to accommodate Third World customers.

Iraq is a good example of a country with a very active TBM program. The Iraqis have already made major modifications to the basic SCUD: the AL HUSSEIN and AL ABBAS variants have significantly greater range than the SCUD. Using mostly locally available expertise and materials, the Iraqis have been continuing their attempts develop completely new TBM systems with even greater range and accuracy.

China is currently developing a new family of mobile, solid-propellant SRBMs and unguided rockets, designated by the Chinese as the "M"-series. Technology associated with the "M" family of missiles may have already been sold to several countries to bolster their indigenous development efforts.

Although TBMs offer significantly increased striking range to fixed targets, Third World nations do not currently have the capability to target and put at risk naval forces operating in the open ocean. Naval forces are, however, potentially vulnerable (especially to TBMs with chemical/biological warheads

with their increased lethal radii) during near-coastal operations and in choke points, ports, anchorages, and amphibious objective areas, where mobility is restricted and targeting problems are more easily resolved.

THIRD WORLD COUNTRIES THAT HAVE/MAY HAVE TBMS BY 2000

ARGENTINA	IRAN	SAUDI ARABIA
AFGHANISTAN	IRAQ	SOUTH AFRICA
BRAZIL	ISRAEL	SYRIA
CHINA	LIBYA	UAE
EGYPT	NORTH KOREA	VIETNAM
INDIA	PAKISTAN	YEMEN

Proliferation of Soviet guidance and re-entry vehicle technologies and the future indigenous development of similar capabilities represent a considerable threat to U.S. naval forces. Given the potential availability of these technologies through non-Soviet countries such as China, South Africa, Argentina, Brazil, Israel, and North Korea, the potential TBM threat is expected to expand. By the year 2000, at least 15 Third World countries are expected to have acquired TBMs.

Stealth/Low and Very Low Observable Technology (LO/VLO)

Several nations are known to be applying low observable (LO) technology to their military forces and others have the ability to produce RAM. About 40 countries have expressed interest in obtaining LO technology or systems. In almost all cases, LO

application is driven by a desire to reduce vulnerability to weapons, rather than by an attempt to escape detection.

The USSR, Great Britain, Australia, France, and Canada are applying RAM coatings to their existing surface combatants in order to control signatures. Sweden is currently working on a small prototype VLO design surface effects ship, and France is building frigates that employ shaping to reduce RCS. Most efforts to reduce ship signatures, both radar and infrared, are targeted towards reducing vulnerability to sea-skimming anti-ship missiles.

The potential effects of LO proliferation are significant, as it would allow countries better to modify their equipment to reduce signatures or to devise tactics to take advantage of their weaknesses. For example, the French have also reportedly begun to incorporate LO features in their next generation RAFALE fighter, probably to reduce vulnerability to radar and IR SAMs and AAMs. France is also taking two approaches to the next generation of anti-ship missiles. Aerospatiale, with German participation, is building the mach-3 ANS anti-ship missile with electronic counter-counter measures (ECCM), and MATRA and Italy's OTO Melara are incorporating RAM to produce an LO OTOMAT-3 anti-ship missile.

Mine Warfare

Naval mines are relatively cheap, easy to deploy, and, if used properly, a significant force multiplier. Iranian mining successes during the late 1980s are a vivid example of both the operational and psychological effectiveness of mines in modern naval warfare. During 1986 and 1987, Iran deployed at least 200 moored contact mines costing only about \$1,000 each. The mines caused damage totaling well over \$100 million to at least ten ships, including the U.S. Navy frigate USS SAMUEL B. ROBERTS. By the end of February of this year, over 120 Iraqi-laid mines had been discovered in the Persian Gulf and neutralized; two U.S. Navy ships were damaged.

In addition to the U.S. and the Soviet Union, at least 45 countries are currently credited with naval mining capabilities. A number of countries stockpile large quantities of old Soviet, American, and British mines augmented by growing numbers of modern mines produced by various countries. At least twenty-one nations are capable of producing mines, and thirteen are confirmed mine exporters.

Despite the continued effectiveness of older mines based on antiquated technology, mine warfare is becoming increasingly sophisticated. Changes are mainly in timing and arming devices and can be applied to existing, older mines as well as new-

production mines. Several countries offer for export a series of "update kits," enabling customers to place more sophisticated controls on older Soviet mines or their derivatives. One example of a state that has developed relatively sophisticated mines on its own is Iraq. More such developments are likely to occur over the next 10-20 years.

Torpedoes

The Third World torpedo threat will increase as advanced technologies are developed, applied, and exported by the major powers. Transfer of warhead, propulsion, guidance, and contributing technologies to developing Third World countries will result in an expansion of both the ASW and ASUW threat to U.S. platforms. New, high-energy torpedo batteries will result in better endurance and higher torpedo speeds while allowing relatively quiet operation. The new electric torpedoes, such as the French MURENE, could pose a significant threat to U.S. submarines, if in unfriendly hands. The widespread application of wake-homing torpedoes could create a significant threat to U.S. surface ships. Continuous improvements and exportation in the area of microelectronics, microprocessing, and exotic materials will lead to improved target acquisition, discrimination, and homing for both ASW and anti-ship torpedoes.

Reconnaissance/Space

In general, the increased commercial availability of space-based remote sensing/reconnaissance technology will allow any country that desires to have a space-based reconnaissance program to acquire one over the next decade. Selected countries that have embarked upon indigenous space-based reconnaissance development will be able to achieve electro-optical imagery resolutions of less than one meter during the present decade. Moreover, in the absence of either the technical capability or national resolve to launch a reconnaissance satellite, a variety of commercial remote sensing capabilities could partially satisfy some national requirements. Commercial image processing capability (with imagery provided by a third party) already approaches state-of-the-art in terms of near-real time image processing speed, ability to create map or holographic (three-dimensional) presentations, and simplicity of operation.

Apart from the European Space Agency and the superpowers, four countries (India, Israel, Japan, and China) now possess a capability to launch satellites. Pakistan, South Africa, Taiwan, and others have programs that could produce this capability by the mid-to-late 90s. Current US Government efforts are aimed at preventing Brazil and Argentina from following suit thereafter. A satellite launch capability has important military

Security guarantees, absent the East-West conflict, are no longer considered (by the Third World) to be unquestionably valid. Many of the regional powers will now find their own solutions to their ambitions or vulnerabilities, and some, indeed, have been working to do this even while under a superpower's umbrella.

Iraq Case Study

Iraq is perhaps the worst-case model for the types of threats the U.S. will face in the future. Unfortunately, it is also the realization -- in a single case -- of the most worrisome trends we have been following with increasing concern in recent years: the acquisition of increasingly sophisticated weapons and technology by aggressive, authoritarian states, often in unstable or volatile regions. In Iraq's case, the problem has been compounded by the country's abundance of hard currency. Per capita, Iraq is potentially the wealthiest aggressor in recent history.

Unfortunately, Iraq and its ambitions lie not only at the heart of the world's most continually volatile region, but also in a region that is of critical importance to the world economy.

Iraq today is the nightmare example of what can happen in an atmosphere of virtually uncontrolled weapons and technology

proliferation. Both East and West have armed Baghdad to the teeth and now have to pay the price. Where Iraqi acquisition of weapons and technology has been restricted by law, Baghdad has gone to extreme and often successful lengths to obtain items illegally, frequently with willing third party accomplices:

- Baghdad has not been constrained by budgetary considerations and has been successful in diversifying its sources of armaments. The United Nations coalition faced weapons and equipment from Soviet, European, Chinese, and other suppliers for which countermeasures and deconfliction methodologies had to be developed: Soviet MiG-29 and Su-24 aircraft, among their most modern and capable; Soviet and Free World SAM and SSM systems; French MIRAGE F-1 aircraft, and the Thomson-CSF KARI air defense system; Chinese SILKWORM SSMS and SILKWORM-armed BADGER bombers are but the most obvious and deadly examples of a bewildering array. Iraq's air-to-air refueling capabilities significantly increased the potential MIRAGE F-1 threat to U.S. and Allied naval forces. Added to this was the plethora of Western-produced, captured Kuwaiti weapons and sensors.
- Iraq has long sought to develop its own armament industries, and has demonstrated impressive progress in that regard. Prior to the war, Baghdad was capable of producing most of its own ammunition and artillery and had developed a variety

of surface-to-surface, surface-to-air, and air-to-surface missiles. Most, if not all, of these are modifications of Soviet equipment, but they clearly demonstrate Iraqi ingenuity in adapting existing items to their own needs and designs. The AL-HUSSEIN and AL-ABBAS variants of the SCUD-B tactical ballistic missile are but the best known of a variety of Iraqi-manufactured munitions.

- In the area of air defense, Iraq developed a very sophisticated, integrated air defense system using Free World and Soviet hardware, resulting in a unique configuration, making it more difficult to understand the system's parameters and initially resulting in reduced confidence in our countermeasures.
- Prior to DESERT STORM, Iraq possessed the largest chemical weapons program in the Third World, as well as an advanced biological warfare program. Baghdad has been aggressively pursuing a nuclear weapon capability.

Iraq's acts changed the Middle East power balance and the way Middle Eastern states will view one another forever. Long-cherished myths -- that an Arab state would never invade and pillage another Arab state, that somehow inter-Arab problems can be solved or papered over under Arab League auspices, that checkbook diplomacy can be used to placate tyrants -- have been

shattered. Hostage-taking on a grand scale occurred and may become commonplace in future.

Other Problem Areas

That India and Pakistan were on the verge of war in early 1990 further demonstrates that traditional animosities will continue to simmer and threaten to boil over despite, or perhaps because of, the end of the Cold War. Another Indo-Pakistani war could involve the use of nuclear or chemical weapons. Even without full-scale war, continual tensions over Kashmir, problems in the Punjab, and ethnic, communal, and religious tensions and violence on a scale not witnessed in decades combine to make the atmosphere in both India and Pakistan extremely volatile. All these factors, combined with weak central governments in both countries, present significant threats to India's democratic system and to Pakistan's new and fragile attempts at democracy. Topping this off, India and Pakistan's weak economies were dealt a serious blow by the Gulf crisis, which initially sent oil prices skyrocketing, threw hundreds of thousands of Indians and Pakistanis out of jobs in Kuwait and Iraq, and cut off millions of dollars in remittances.

India undoubtedly still retains its vision and goal of being the great power in the Indian Ocean. Its power projection capabilities have developed steadily, but budgetary constraints

Instability in the region caused by the Gulf war could provide Libya the guise under which to settle old scores with the U.S. and other nations.

-- Iran has provided similar support for Hizballah in Lebanon and the Shiite activists in Afghanistan, Pakistan, Iraq, and other countries. It views DESERT STORM with great suspicion, and long-term U.S. military presence in the region could make the United States a likely Iranian-sponsored terrorist target. Iranian radicals remain virulently anti-United States, and Iran, like Libya, could attempt to capitalize on a period of instability in the region. Iran also continues to conduct attacks on its own dissidents throughout the world, showing brazen disregard for the countries in which the attacks occur.

Disregard for innocent human lives is a hallmark of terrorists. Threats include suicide attacks from air, land, and sea. There seems to be a limitless supply of untrained novices willing to die for any number of causes as long as it makes a big impression in lives lost or property damage. Their activities even provide a certain economy of scale -- cheap and locally available resources -- as well as a measure of plausible denial should it become politically expedient.

For the purposes of this discussion, there is no significant distinction between terrorists and insurgents, who are sub-national groups that often resort to terrorist tactics as a means of overthrowing or attempting to overthrow established governments. Insurgencies worldwide not only threaten governments friendly to the United States, but also U.S. personnel in those countries:

- In the Philippines there has been an increased willingness by the New People's Army to attack Americans, especially during the past two rounds of the Philippine base negotiations. On at least four occasions, the Naval Investigative Service (NIS) and other U.S. agencies have uncovered specific threats to U.S. personnel, which probably prevented a terrorist attack.
- Latin American insurgents also continue to target U.S. personnel. The most tragic recent example is the January 1991 downing of a U.S. helicopter in El Salvador and the subsequent murder of two crew members by FMLN insurgents. Other incidents which occurred in 1990 include the bombing of a discotheque in Panama, which killed one U.S. soldier and wounded 14 others, including three U.S. Navy personnel; and another bombing in Chile, which injured three U.S. sailors. Latin America saw a total of nine terrorist attacks on Department of the Navy assets alone last year.

The list of insurgents and terrorist groups is large and seems to be growing. Decentralization of state power in Eastern Europe and the Soviet Union could lead to a rash of new terrorist groups from among the minorities that were either absorbed wholesale or splintered across borders in the extensive redrawing of borders following both World Wars.

Chemical and biological warfare technology is available to various terrorist groups whose ideology, modus operandi, and political objectives could allow for their employment. These weapons are in the hands of the principal state sponsors of international terrorism, and the technology is understood by numerous group leaders. Thus far, terrorists have not yet used CB weapons, although the possibility has not been ruled out. It is more likely that a state sponsor, such as Iraq, would use its clandestine services to conduct terrorism with CB weapons than to entrust their use to a terrorist group.

Drug Developments in 1990

The international narcotics trade continues to be a destabilizing force worldwide and a major security threat to a number of nations. Some of the news in 1990 was good. For the first time in a decade, there was a halt to the rise of coca cultivation and opium production. Total coca cultivation, which had been increasing annually, levelled off in 1990; in Bolivia